

## CLAIMS:

1. A radio receiver, comprising:
  - a pulse generator, for generating pulses based on an expected received signal;
  - a multiplier, for multiplying a received signal by the generated pulses; and
  - a circuit for receiving the multiplier output, wherein said circuit is operable in
- 5 a first mode to act as a low-pass filter, and wherein said circuit is operable in a second mode to act as an integrator.
2. A receiver as claimed in claim 1, comprising an analog-to-digital converter, for receiving an output from said circuit.
- 10 3. A receiver as claimed in claim 1, wherein said circuit includes an analog-to-digital converter.
4. A receiver as claimed in claim 3, wherein said circuit comprises a sigma-delta
- 15 analog-to-digital converter having a feedback loop, and an integrator, wherein, in said first mode, said integrator is included in said feedback loop of said sigma-delta analog-to-digital converter, and, in said second mode, the output of the multiplier is connected to the integrator, and the integrator output is connected to the sigma-delta analog-to-digital converter.
- 20 5. A receiver as claimed in any preceding claim, comprising means for detecting when the receiver has synchronized to a received pulse sequence, and for controlling said receiver to operate in said first mode before it has synchronized to a received pulse sequence, and to operate in the second mode when it has synchronized to a received pulse sequence.
- 25 6. A method of operating a radio receiver, comprising:
  - multiplying a received signal by a sequence of generated pulses;
  - in a first mode, applying a multiplication output to a low-pass filter, and
  - in a second mode, applying the multiplier output to an integrator.

7. A method as claimed in claim 6, further comprising:
- detecting when the receiver has synchronized to a received pulse sequence;
  - operating the receiver in said first mode before it has synchronized to a
- 5 received pulse sequence, and
- operating the receiver in the second mode when it has synchronized to a received pulse sequence.
8. A method as claimed in claim 6 or 7, comprising generating said sequence of
- 10 pulses in a form corresponding to pulses in an expected received signal.
9. A method as claimed in one of claims 6 to 8, for receiving an Ultra Wideband radio signal.
- 15 10. A wireless communications system, comprising:
- a radio transmitter, for generating and transmitting a radio signal; and
  - a radio receiver, wherein the radio receiver comprises:
    - a pulse generator, for generating pulses based on an expected received signal;
    - a multiplier, for multiplying a received signal by the generated pulses; and
- 20 - a circuit for receiving the multiplier output, wherein said circuit is operable in a first mode to act as a low-pass filter, and wherein said circuit is operable in a second mode to act as an integrator.
11. A wireless communications system as claimed in claim 10, wherein said
- 25 receiver further comprises an analog-to-digital converter, for receiving an output from said circuit.
12. A wireless communications system as claimed in claim 10, wherein said
- 30 circuit includes an analog-to-digital converter.
13. A wireless communications system as claimed in claim 12, wherein said circuit comprises a sigma-delta analog-to-digital converter having a feedback loop, and an integrator, wherein, in said first mode, said integrator is included in said feedback loop of said sigma-delta analog-to-digital converter, and, in said second mode, the output of the

multiplier is connected to the integrator, and the integrator output is connected to the sigma-delta analog-to-digital converter.

14. A wireless communications system as claimed in claim 10, wherein said  
5 receiver further comprises means for detecting when the receiver has synchronized to a received pulse sequence, and for controlling said receiver to operate in said first mode before it has synchronized to a received pulse sequence, and to operate in the second mode when it has synchronized to a received pulse sequence.